SEMI E28-92 (Reapproved 0710)
GUIDELINE FOR PRESSURE SPECIFICATIONS OF THE MASS FLOW CONTROLLER

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1 Purpose

1.1 The purpose of this guideline is to establish a uniform, worldwide means to describe pressure parameters as they relate to mass flow controllers (MFC). It is intended to prevent confusion and misunderstanding between manufacturers and users.

2 Scope

2.1 This guideline contains definitions of terms which describe gas pressure in MFCs as used in the semiconductor industry. SI units are the reference units for this document.

NOTICE: This standard does not purport to address safety issues, if any, associated with its use. It is the responsibility of the users of this standard to establish appropriate safety and health practices and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 *SEMI Standard*

SEMI E12 — Standard for Standard Pressure and Standard Temperature for Flow Units Used in Mass Flow Meters and Mass Flow Controllers

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

4 Terminology

4.1 *Definitions*

4.1.1 *units of pressure* — several units of pressure are commonly used in conjunction with MFCs. The Pascal is the preferred unit of pressure for use within the semiconductor industry. Units of pressure include the following:

- Pascal (Pa)
- Pounds per square inch (psi)
- Torr (T)
- Kilograms per square centimeter (kg/cm^2)
- Bar (B)

NOTE 1: Units of pressure are sometimes expressed as an equivalent height of a column of some liquid, such as millimeters of mercury or inches of water. These units require correction to some standard for liquid density and gravity. As these corrections are neither broadly standardized nor often even addressed, their use should be avoided.

4.1.2 *absolute pressure* — the pressure measured relative to zero pressure (perfect vacuum) (see Figure 1).

NOTE 2: Absolute pressure is the pressure illustrated by the ideal gas law, PV = nRT. For example, when the number of moles, n, equals zero (no molecules), absolute pressure, P, equals zero. To indicate unambiguously that a pressure measurement is absolute, the following abbreviations should be used:

- Pa — Pascal (absolute assumed)
- psi (a) — Pounds per square inch, absolute
- Torr — Torr (absolute assumed)
- kg/cm^2(a) — Kilograms per square centimeter, absolute
- B (a) — Bar, absolute

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4.1.2.1 Units such as Pascal and Torr are customarily absolute units.

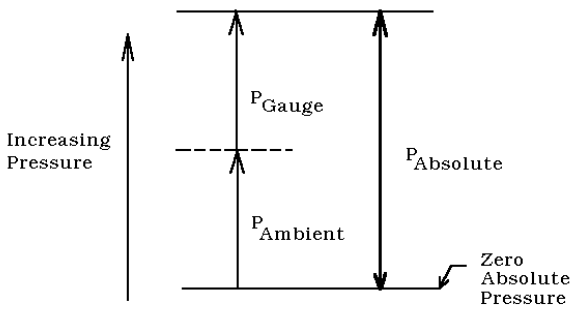

Figure 1
Relationship Between Absolute, Gauge,and Ambient Pressure

4.1.3 *ambient pressure* — the absolute pressure of the medium surrounding the MFC (see Figure 2).

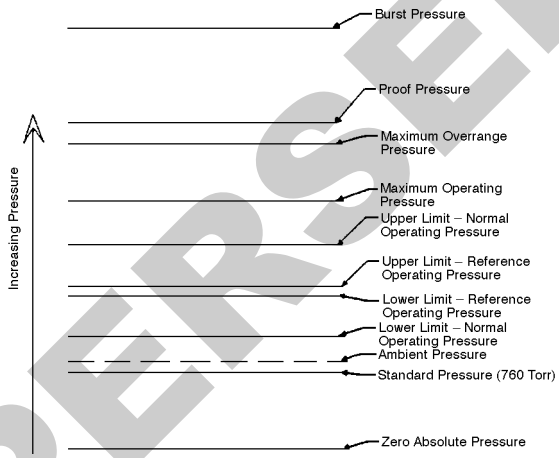

Figure 2
Pressure Definitions for MFCs

4.1.4 *burst pressure* — the gas pressure at which the MFC may rupture.

4.1.5 *differential pressure* — the difference in absolute pressure between two points of measurement in a system (see Figure 3).

NOTE 3: To indicate unambiguously that a pressure measurement is differential, the following abbreviations should be used:

- Pa (d) — Pascal, differential
- psi (d) — Pounds per square inch, differential
- Torr (d) — Torr, differential
- kg/cm^2(d) — Kilograms per square centimeter, differential
- B (d) — Bar, differential

4.1.5.1 Gauge pressures may also be used in the differential pressure calculation if consistency is maintained. A common error would be to take the difference between an inlet gauge pressure and an outlet absolute pressure without first converting to common units.

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